We claim:

1. An MRI antenna, comprising:

an inner conductor with first and second ends for being electrically connected across a capacitor to tune the inner conductor to a frequency, the first and second ends providing an output of the antenna; and

an outer conductor substantially surrounding the inner conductor, the outer conductor having first and second ends for being electrically connected across a capacitor to tune the outer conductor to the frequency; ,

the inner and outer conductors defining a region for receiving a body part and being inductively coupled during operation.

2. The MRI antenna of Claim 1, wherein the inductive coupling is tight or critical coupling.

3. The MRI antenna of Claim 1, wherein the first and second ends of the outer conductor are electrically connected across a capacitor.

4. The MRI antenna of Claim 3, wherein the first and second ends of the inner conductor are electrically connected across a capacitor.

5. The MRI antenna of Claim 4, wherein the capacitor is a variable capacitor.

6. The MRI antenna of Claim 5, wherein the variable capacitor is part of a receiver subsystem of an MRI system.

7. The MRI antenna of Claim 1, wherein the inner and outer conductors comprise a first coaxial cable unit, the antenna further comprising a second coaxial cable unit comprising a second inner conductor and a second outer conductor substantially surrounding the second inner conductor, the second inner and outer conductors being inductively coupled during operation, wherein the second inner conductor is electrically connected to the first inner conductor, the second outer conductor is electrically connected to the second outer conductor and the first coaxial cable unit is inductively coupled to the second coaxial cable unit during operation.

8. The MRI antenna of Claim 1, wherein:

the inner conductor comprises a first section between the first end and a third end and a second section between the second end and a fourth end the third end and the fourth end being electrically connected across a capacitor; and

the outer conductor comprises a first section between the first end and a third end and a second section between the second end and a fourth end, the third and fourth ends being electrically connected across a capacitor.

9. The MRI antenna of Claim 8, further comprising a second coaxial cable unit supported by the support adjacent to the first coaxial cable unit such that the first and second coaxial cable units are inductively coupled during operation, the second coaxial cable unit comprising a second inner conductor and a second outer conductor, each having first and second ends, respectively, wherein the second outer conductor substantially surrounds the second inner conductor and the first end of the inner conductor is electrically connected to the second end of

the inner conductor across a capacitor and the first end of the outer conductor is connected to the second end of the outer conductor across a capacitor;

the second inner conductor comprising a first section between the first end and a third end and a second section between the second end and a fourth end, the third end and the fourth end being electrically connected across a capacitor;

the second outer conductor comprising a first section between the first end and a third end and a second section between the second end and a fourth end, the second and fourth ends being electrically connected across a capacitor.

10. The MRI antenna of Claim 9, wherein the first and second coaxial cable units are tightly or critically coupled to each other.

11. The MRI antenna of Claim 1, wherein the first and second ends of the outer conductor are connected through a copper adaptor.

12. The MRI antenna of Claim 1, wherein the first and second ends of the outer conductors are directed radially outward from the region for receiving a body part, parallel to each other, the first and second ends being connected along adjacent sides of the outer conductor, proximate the first and second ends.

13. The MRI antenna of Claim 1, wherein the first inner conductor and the first outer conductor define a first coaxial cable unit, the antenna further comprising a second inner conductor and a second outer conductor substantially surrounding the second inner conductor, the second inner conductor and the second outer conductor being inductively coupled during operation, the second inner conductor and the second outer conductor defining a second

coaxial cable unit, the first and second coaxial cable units being concentric and lying in substantially the same plane,

the second coaxial cable unit being within a region defined by the first coaxial cable unit, the outer conductor of the first coaxial cable unit, and the outer conductor of the second coaxial cable unit each having first and second adjacent ends;

wherein the first end of the outer conductor of the first coaxial cable unit is directly electrically connected to the first end of the outer conductor of the second coaxial cable unit, the second end of the outer conductor of the first coaxial cable unit is directly electrically connected to the second end of the outer conductor of the second coaxial cable unit, and the first end of the first outer conductor is electrically connected to the second end of the first outer conductor through a capacitor, and

a first end of the second inner conductor is directly electrically connected in series to a first end of the first inner conductor, a second end of the second inner conductor is directly electrically connected in series to the second end of the first inner conductor and the inner conductors are connected across a capacitor to provide an output of the antenna.

15. The MRI antenna of Claim 1, further comprising a plurality of inner conductors within the outer conductor, the inner conductors being electrically connected to form a circuit tunable to the frequency.

16. The MRI antenna of Claim 15, wherein certain of the inner conductors are connected in series and certain of the inner conductors are connected in parallel.

17. The MRI antenna of Claim 15, further comprising a second outer conductor substantially surrounding the first outer conductor, the second outer conductor having

first and second ends connected across a capacitor, the second outer conductor being tunable to the frequency and the second outer conductor defining a plurality of openings through the second outer conductor.

18. The MRI antenna of Claim 1, further comprising a second outer conductor substantially surrounding the first outer conductor, the second outer conductor having first and second ends connected across a capacitor, the second outer conductor being tunable to the frequency and the second outer conductor defining a plurality of openings through the second outer conductor.

19. The MRI antenna of Claim 1, further comprising:

a second inner conductor with first and second ends for being electrically connected across a capacitor to tune the inner conductor to the frequency;

a second outer conductor substantially surrounding the second inner conductor, the second outer conductor having first and second ends for being electrically connected across a capacitor to tune the second outer conductor to the frequency, the second inner conductor and the second outer conductors being inductively coupled during operation;

the first inner conductor and the first outer conductor defining a first coaxial cable unit lying in a first plane and the second inner conductor and the second outer conductors defining a second coaxial cable unit lying in a second plane perpendicular to the first plane, wherein the second inner conductor provides a second output of the antenna across the first and second ends of the second inner conductor.

20. An MRI antenna comprising:

first and second inductively coupled windings;

wherein the first and second windings are each tuned to the same frequency, the first winding substantially shields the second winding from direct reception of magnetic resonance signals, and the second winding provides an output of the antenna.

21. The MRI antenna of Claim 20, wherein the first winding and the second winding each comprise at least one inductor and at least one capacitor electrically connected in series, wherein the at least one inductor of the first winding is inductively coupled to the at least one inductor of the second winding.

22. The MRI antenna of Claim 20, wherein the inductive coupling is tight or critical coupling.

Sub C2

22. An MRI antenna, comprising:

a coaxial cable comprising an inner conductor and an outer conductor substantially surrounding the inner conductor, the outer conductor and the inner conductor being inductively coupled and tunable to the Larmor frequency of the species of interest during operation, wherein the inner conductor provides an output of the antenna.

24. The MRI antenna of Claim 23, wherein the inner conductor comprises a plurality of inductors separated by capacitors, and the outer conductor comprises a plurality of inductors separated by capacitors.

25. The MRI antenna of Claim 23, wherein each inductor of the inner conductor corresponds to an inductor of the outer conductor.

26 23
25. The MRI antenna of Claim 22, wherein at least one of the inductors and capacitors of the inner conductor and at least one of the inductors and capacitors of the outer conductor are part of a respective coaxial cable unit, the antenna comprising a plurality of coaxial cable units.

27 23
26. The MRI antenna of Claim 22, wherein the inductive coupling is tight or critical coupling.

Sub C3

27. An MRI antenna, comprising:

detecting means for directly detecting magnetic resonance signals emitted by a subject;

receiving means for inductively receiving signals corresponding to the detected magnetic resonance signals from the detecting means, and for providing received signals for analysis;

means for shielding the receiving means from direct detection of the magnetic resonance signals means.

29 28
28. The MRI antenna of Claim 27, wherein the detecting means and the shielding means are the same.

30 28
29. The MRI antenna of Claim 27, further comprising filtering means for filtering the detected signals and the received signals.

Sub C4

30. An MRI antenna comprising:

a first inner conductor with first and second ends;

a first outer conductor with first and second ends, the first outer conductor substantially surrounding the first inner conductor to form a first coaxial cable unit defining a region for receiving a body part, the first inner conductor and the first outer conductor being inductively coupled during operation;

a second inner conductor with first and second ends;

a second outer conductor with first and second ends, the second outer conductor substantially surrounding the second inner conductor to form a second coaxial cable unit defining a region for receiving a body part, the second inner conductor and the second outer conductor being inductively coupled during operation;

wherein the inner conductors of the first and second coaxial cable units are electrically connected to form, at least in part, a first circuit tunable to a frequency, and the outer conductors of the first and second coaxial cable units are electrically connected to form, at least in part, a second circuit tunable to the same frequency, the output of the antenna being provided from the first circuit comprising the inner conductors.

32 31. The MRI antenna of Claim 30, wherein the inner conductors are electrically connected through at least one capacitor and the outer conductors are electrically connected through at least one capacitor.

33 32. The MRI antenna of Claim 31, wherein the electrical connection is a series connection.

33. The MRI antenna of Claim 30, further comprising:

a third inner conductor with first and second ends;

a third outer conductor with first and second ends, the third outer conductor substantially surrounding the third inner conductor to form a third coaxial cable unit defining a region for receiving a body part, the third inner conductor and the third outer conductor being inductively coupled during operation;

wherein the inner conductor of the third coaxial cable unit is electrically connected to the first circuit and the outer conductor of the third coaxial cable is electrically connected to the second circuit.

35 34. The MRI antenna of Claim 34, wherein the first, second and third coaxial cable units lie in first, second and third respective parallel planes and are aligned with respect to an axis perpendicular to the first, second and third parallel planes.

36 35. The MRI antenna of Claim 34, wherein the inner conductors are electrically connected through at least one capacitor and the outer conductors are electrically connected through at least one capacitor.

37 36. The MRI antenna of Claim 36, wherein the electrical connection is a series connection.

39 37. An MRI antenna, comprising:

a first coaxial cable unit having a first outer conductor with first and second ends and a first inner conductor with first and second ends, respectively, wherein the first outer conductor substantially surrounds the first inner conductor, the first outer conductor and the first inner conductor being inductively coupled during operation;

the first coaxial cable unit defining a region for receiving a body part;

a second coaxial cable unit having a second outer conductor with first and second ends and a second inner conductor with first and second ends, wherein the second outer conductor substantially surrounds the second inner conductor, the second outer conductor and the second inner conductor being inductively coupled during operation, the second coaxial cable unit defining a region for receiving a body part;

a third coaxial cable unit having a third outer conductor with first and second ends and a third inner conductor with first and second ends, wherein the third outer conductor substantially surrounds the third inner conductor, the third outer conductor and the third inner conductor being inductively coupled during operation, the third coaxial cable unit defining a region for receiving a body part;

wherein:

the first end of the first inner conductor of the first coaxial cable unit is adapted to be connected to a receiver portion of an MRI device;

the second end of the first inner conductor of the first coaxial cable unit is electrically connected to the first end of the second inner conductor of the second coaxial cable unit through a capacitor;

the second end of the second inner conductor of the second coaxial cable unit is electrically connected in series to the first end of the third inner conductor of the third coaxial cable unit through a capacitor;

the second end of the third inner conductor of the third coaxial cable unit is adapted to be connected to a receiver portion of an MRI system;

the first end of the first outer conductor of the first coaxial cable unit is electrically connected to the first end of the second outer conductor of the second coaxial cable across a capacitor;

the second end of the second outer conductor of the second coaxial cable unit is electrically connected in series to the first end of the third outer conductor of the third coaxial cable through a capacitor; and

a second end of the third outer conductor of the third coaxial cable is electrically connected in series to a second end of the first outer conductor of the first coaxial cable;

wherein the circuit comprising the inner conductors and the circuit comprising the outer conductors are tunable to the same frequency

40 ~~38~~. The MRI antenna of Claim 39 ~~37~~, wherein the first, second and third coaxial cables lie in first, second and third parallel planes, respectively.

41 ~~39~~. The MRI antenna of Claim 40 ~~38~~, wherein the first, second and third coaxial cables are aligned along an axis perpendicular to the first, second and third parallel planes.

42 ~~40~~. The MRI antenna of Claim 39 ~~37~~, wherein the first and second coaxial cable units are inductively coupled and the second and third coaxial cable units are inductively coupled.

43 ~~41~~. An MRI antenna, comprising:

a support;

first and second coaxial cable units supported by the support in a first plane to define a region for receiving a body part, each coaxial cable unit comprising an inner conductor and an outer conductor substantially surrounding the inner conductor, the inner and outer conductors each comprising first and second ends and being inductively coupled during operation;

wherein the inner conductors of the first and second coaxial cable units are electrically connected to form, at least in part, a circuit tunable to a frequency and the outer conductors of the first and second coaxial cable units are electrically connected to the outer conductors of the second coaxial cable unit to form a second circuit tunable to the frequency.

44. The MRI antenna of Claim 43, wherein the inner conductors and the outer conductors are electrically connected through capacitors.

45. The MRI antenna of Claim 44, wherein the electrical connections are series connections.

46. The MRI antenna of Claim 43, further comprising:

third and fourth coaxial cable units supported by the support adjacent to the first and second coaxial cable units in a second plane;

fifth and sixth coaxial cable units supported by the support adjacent to the first and second coaxial cable units in a third plane, the third plane being on an opposite side of the first and second coaxial cable units as the second plane;

wherein the inner and outer conductors of the third, fourth, fifth and sixth coaxial cable units are electrically connected to form a single circuit tunable to the frequency.

47 45. The MRI antenna of Claim 44 46, wherein the inner conductors and the outer conductors are electrically connected through capacitors.

48 46. The MRI antenna of Claim 45 47, wherein the electrical connections are series connections.

50 47. The MRI antenna of Claim 44 46, further comprising:

seventh and eighth coaxial cable units supported by the support in a fourth plane between the first plane and the third plane to define a region for receiving the body part, the seventh and eight coaxial cable units each comprising an inner conductor and an outer conductor substantially surrounding the inner conductor, the inner and outer conductors each having first and second ends, respectively, and being inductively coupled during operation;

wherein the inner conductors of the seventh and eighth coaxial cable units are electrically connected to form a circuit tunable to the frequency, and the outer conductors of the seventh and eighth coaxial cable units are electrically connected to form a circuit tunable to the frequency.

51 48. The MRI antenna of Claim 47 50, wherein the inner conductors and the outer conductors are electrically connected through capacitors.

49. The MRI antenna of Claim 47, wherein the electrical connections are series connections.

52 50. The MRI antenna of Claim 47 50, wherein the first, second, third and fourth planes are parallel to each other.

53 51. The MRI antenna of Claim 52 50, wherein the first and second, third and fourth, fifth and sixth, and seventh and eighth coaxial cables are aligned with respect to an axis perpendicular to the first, second, third and fourth planes.

54 52. The MRI antenna of Claim 50 47, wherein adjacent pairs of coaxial cable units are inductively coupled.

55 53. The MRI antenna of Claim 50 47, wherein the seventh and eighth coaxial cable units have a diameter less than a diameter of the first and second, third and fourth, and fifth and sixth coaxial cable units.

56 54. An MRI antenna, comprising:

a support;

first and second coaxial cable units supported by the support in a first plane to define a region for receiving a body part, each coaxial cable unit comprising an inner conductor and an outer conductor substantially surrounding the inner conductor, the inner and outer conductors each comprising first and second ends and being inductively coupled during operation;

wherein:

the first end of the inner conductor of the first coaxial cable unit is electrically connected to the first end of the inner conductor of the second coaxial cable unit across a first capacitor and the second end of the inner conductor of the first coaxial cable unit is connectable to the second end of the inner conductor of the second coaxial cable unit across a second capacitor to tune the inner conductors to a frequency, the output of the antenna being provided across the second capacitor; and

the first end of the outer conductor of the first coaxial cable unit is electrically connected to the first end of the outer conductor of the second coaxial cable unit across a capacitor and the second end of the outer conductor of the first coaxial cable unit is electrically connected to the second end of the outer conductor of the second coaxial cable unit across a capacitor, for tuning the outer conductor to the frequency.

57. The MRI antenna of Claim 54, further comprising

third and fourth coaxial cable units supported by the support adjacent to the first and second coaxial cable units in a second plane; and

fifth and sixth coaxial cable units supported by the support adjacent to the first and second coaxial cable units in a third plane, the third plane being on an opposite side of the first and second coaxial cable units as the second plane;

wherein a first end of an inner conductor of the third coaxial cable unit is electrically connected to a first end of the inner conductor of the fourth coaxial cable unit across a capacitor, a second end of an inner conductor of the third coaxial cable unit is electrically connected to a first end of an outer conductor of the sixth coaxial cable unit across a capacitor and a second end of the inner conductor of the fourth coaxial cable unit is electrically connected to a second end of the outer conductor of the third coaxial cable unit,

a second end of an inner conductor of the fifth coaxial cable unit is electrically connected to a second end of an inner conductor of the sixth coaxial cable unit through a capacitor and a second end of an outer conductor of the fifth coaxial cable unit is electrically connected to a second end of the outer conductor of the sixth coaxial cable unit across a capacitor, and the circuit comprising the inner and outer conductors of the third, fourth, fifth and sixth coaxial cable units is tuned to the frequency, and

a first end of an inner conductor of the fifth coaxial cable unit is electrically connected to a second end of the outer conductor of the fourth coaxial cable unit.

56. The MRI antenna of Claim 51, further comprising:

seventh and eight coaxial cable units supported by the support in a fourth plane between the first plane and the third plane to define a region for receiving the body part, the seventh and eight coaxial cable units each comprising an inner conductor and an outer conductor substantially surrounding the inner conductor, the inner and outer conductors each having first and second ends, respectively, and being inductively coupled during operation;

wherein the first end of the inner conductor of the seventh coaxial cable unit is electrically connected to the first end of the inner conductor of the eight coaxial cable unit across a capacitor and the second end of the inner conductor of the seventh coaxial cable unit is electrically connected to the second end of the inner conductor of the eight coaxial cable unit across a capacitor, to tune the inner conductors to the frequency, and

the first end of the outer conductor of the seventh coaxial cable unit is electrically connected to the first end of the outer conductor of the eight coaxial cable unit through a capacitor and the second end of the outer conductor of the seventh coaxial cable unit is electrically connected to the second end of the outer conductor of the eight coaxial cable unit through a capacitor, to tune the outer conductors to the same frequency.

57. The MRI antenna of Claim 56, wherein the first, second, third and fourth planes are parallel to each other.

58. The MRI antenna of Claim 56, wherein the first and second, third and fourth, fifth and sixth, and seventh and eighth coaxial cables are aligned with respect to an axis perpendicular to the first, second, third and fourth planes.

59. The MRI antenna of Claim 56, wherein adjacent pairs of coaxial cable units are inductively coupled.

60. The MRI antenna of Claim 56, wherein the seventh and eighth coaxial cable units have a diameter less than a diameter of the first and second, third and fourth, and fifth and sixth coaxial cable units.

61. An MRI antenna comprising:

a first inner conductor with first and second ends;

a first outer conductor substantially surrounding the first inner conductor;

the first inner conductor and the first outer conductor defining a first coaxial cable unit defining a region for receiving a body part;

a second inner conductor and a second outer conductor substantially surrounding the second inner conductor, the second inner conductor and the second outer conductor being inductively coupled during operation, and defining a second coaxial cable unit;

wherein:

the first and second coaxial cable units are concentric and lie in substantially in the same plane, the second coaxial cable unit being within a region defined by the first coaxial cable unit;

the first outer conductor and the second outer conductor each have first and second adjacent ends, the first end of the first outer conductor being directly connected to the

first end of the second outer conductor, the second end of the first outer conductor being directly connected to the second end of the second outer conductor, and the first end of the first outer conductor being electrically connectable to the second end of the first outer conductor across a capacitor to tune the outer conductors to a frequency;

a first end of the first inner conductor is directly electrically connected in series to a first end of the second inner conductor and a second end of the first inner conductor is directly electrically connected in series to the second end of the second inner conductor; and

the first and second ends of the second inner conductor are electrically connectable across a capacitor to tune the inner conductors to the frequency and to provide an output of the antenna.

62. An MRI antenna comprising:

an outer conductor with first and second ends for being electrically connected across a capacitor to tune the outer conductor to a frequency; and

a plurality of inner conductors substantially surrounded by the outer conductor, the inner conductors being connectable across at least one capacitor to tune the inner conductors to the frequency, the outer conductor and the inner conductors being inductively coupled during operation;

the inner and outer conductors defining a region for receiving a body part, where an output of the antenna is provided from the inner conductors, the inner conductors being electrically connected to form a circuit tunable to the frequency.

63. The MRI antenna of Claim 62, wherein certain of the inner conductors are connected in series and certain of the inner conductors are connected in parallel.

68. The MRI antenna of Claim 62, wherein the inner conductors are connected in parallel.

69. The MRI antenna of Claim 62, further comprising multiple coaxial cable units each comprising an outer conductor and a plurality of inner conductors, wherein the outer conductors are electrically connected across a capacitor to form a first circuit tunable to the frequency and the inner conductors are electrically connected to form a second circuit tunable to the frequency.

70. The MRI antenna of Claim 69, wherein the outer conductors are connected in parallel.

71. The MRI antenna of claim 69, comprising three coaxial cable units, each unit comprising four inner conductors;

wherein

the two inner conductors of a first unit are electrically connected in series through a capacitor and two inner conductors are electrically connected in parallel, the series connected conductors being electrically connected to the parallel connected conductors through a second capacitor;

a first two inner conductors of the second unit are electrically connected in parallel and a second two inner conductors of the second unit are electrically connected in parallel, the first two and second two parallel connected inner conductors being electrically connected through a third capacitor, and the parallel connected inner conductors of the first unit being electrically connected to the first two parallel connected inner conductors of the second unit through a fourth capacitor;

three inner conductors of the third unit being electrically connected in parallel to a fourth inner conductor of the third unit through a fifth capacitor, the fourth inner conductor being electrically connected in parallel to the second two parallel connected inner conductors of the second unit and to the third capacitor; and

one inner conductor of the series connected inner conductors of the first unit and one parallel connected inductor of the fourth unit being connectable across a capacitor to provide an output of the antenna.

72 66
68. The MRI antenna of Claim 62, further comprising:

a second outer conductor substantially surrounding the first outer conductor, the second outer conductor defining a plurality of holes through the second outer conductor,

the second outer conductor having first and second ends electrically connected across a capacitor to tune the second outer conductor to the frequency;

the second outer conductor and the first outer conductor being inductively coupled during operation.

73 66
69. The MRI antenna of Claim 62, comprising four inner conductors, wherein in the circuit, two of the inner conductors are electrically connected in series through a capacitor and two of the inner conductors are electrically connected in parallel, the series connected inductors and the parallel connected inductors being electrically connected to each other through a capacitor.

Sub C7

70. An MRI antenna, comprising:

an inner conductor with first and second ends electrically connectable across a capacitor to tune the inner conductor to a frequency, the first and second ends providing an output of the antenna;

a first outer conductor substantially surrounding the inner conductor, the first outer conductor having first and second ends being electrically connected across a capacitor to tune the first outer conductor to the frequency;

a second outer conductor substantially surrounding the first outer conductor, the second outer conductor having first and second ends electrically connected across a capacitor to tune the second outer conductor to the frequency, the second outer conductors defining a plurality of holes therethrough; and

the inner and outer conductors defining a region for receiving a body part and being inductively coupled during operation.

71. A magnetic resonance imaging system comprising:

a receiver system; and

an antenna connected to the receiver system, the antenna comprising:

a support;

first and second coaxial cable units supported by the support in a first plane to define a region for receiving a body part, each coaxial cable unit comprising an inner conductor and an outer conductor substantially surrounding the inner conductor, the inner and outer conductors each comprising first and second ends;

wherein the first end of the inner conductor of the first coaxial cable unit is electrically connected to the first end of the inner conductor of the second coaxial cable unit across a first capacitor and the second end of the inner conductor of the first coaxial cable unit is

electrically connected to the second end of the inner conductor across a second capacitor to tune the inner conductors to a frequency, and

the first end of the outer conductor of the first coaxial cable unit is electrically connected to the first end of the outer conductor of the second coaxial cable unit across a capacitor and the second end of the outer conductor of the first coaxial cable unit is electrically connected to the second end of the outer conductor of the second coaxial cable unit across a capacitor to tune the outer conductors to the same frequency as the inner conductors, and

the antenna is connected to the receiver system across the second capacitor.

78. An magnetic resonance imaging system comprising:

a receiver subsystem; and

an antenna connected to the receiver subsystem, the antenna comprising:

an inner conductor with first and second ends electrically connected across a capacitor to tune the inner conductor to a frequency, the first and second ends being connected to the receiver subsystem; and

an outer conductor substantially surrounding the inner conductor, the outer conductor having first and second ends electrically connected across a capacitor to tune the outer conductor to the same frequency as the inner conductor;

the inner and outer conductors defining a region for receiving a body part.

79. The magnetic resonance imaging system of claim 78, comprising a plurality of inner conductors, electrically connected to form a circuit tuned to the frequency.

80 74. The magnetic resonance imaging system of claim 79, further comprising a second outer conductor surrounding the first outer conductor, the second outer conductor having first and second ends electrically connected across a capacitor to tune the second outer conductor to the frequency, the second outer conductor defining a plurality of holes through the conductor.

81 75. A magnetic resonance imaging system comprising:

a receiver subsystem; and

an antenna connected to the receiver subsystem, the antenna comprising:

a first coaxial cable having a first outer conductor with first and second ends and a first inner conductor with first and second ends, respectively, wherein the first outer conductor substantially surrounds the first inner conductor, the coaxial cable unit defining a region for receiving a body part;

a second coaxial cable unit having a second outer conductor with first and second ends and a second inner conductor with first and second ends, wherein the second outer conductor substantially surrounds the second inner conductor, the second coaxial cable unit defining a region for receiving a body part;

a third coaxial cable unit having a third outer conductor with first and second ends and a third inner conductor with first and second ends, wherein the third outer conductor substantially surrounds the third inner conductor, the third coaxial cable defining a region for receiving a body part;

wherein:

the first end of the first inner conductor of the first coaxial cable unit is connected to a receiver subsystem;

the second end of the first inner conductor of the first coaxial cable unit is electrically connected to the first end of the second inner conductor of the second coaxial cable through a capacitor;

the second end of the second inner conductor of the second coaxial cable unit is electrically connected in series to the first end of the third inner conductor of the third coaxial cable unit through a capacitor;

the second end of the third inner conductor of the third coaxial cable unit is connected to the receiver subsystem;

the first end of the first outer conductor of the first coaxial cable is electrically connected to the first end of the second outer conductor of the second coaxial cable across a capacitor;

the second end of the second outer conductor of the second coaxial cable is electrically connected in series to the first end of the third outer conductor of the third coaxial cable through a capacitor; and

a second end of the third outer conductor of the third coaxial cable is electrically connected in series to a second end of the first outer conductor of the first coaxial cable;

wherein the circuits comprising the inner conductors and the circuits comprising the outer conductors are tuned to the same frequency.

86. A magnetic resonance imaging system, comprising:

a receiver system; and

an antenna coupled to the receiver system, the antenna comprising:

a first inner conductor with first and second ends;

a first outer conductor substantially surrounding the first inner conductor;

the first inner conductor and the first outer conductor defining a first coaxial cable unit defining a region for receiving a body part;

a second inner conductor and a second outer conductor substantially surrounding the second inner conductor, the second inner conductor and the second outer conductor being inductively coupled during operation, and defining a second coaxial cable unit;

wherein:

the first and second coaxial cable units are concentric and lie in substantially in the same plane, the second coaxial cable unit being within a region defined by the first coaxial cable unit;

a second inner conductor and a second outer conductor substantially surrounding the second inner conductor, the second inner conductor and the second outer conductor being inductively coupled during operation, and defining a second coaxial cable unit;

wherein:

the first and second coaxial cable units are concentric and lie in substantially in the same plane, the second coaxial cable unit being within a region defined by the first coaxial cable unit;

the first outer conductor and the second outer conductor each have first and second adjacent ends, the first end of the first outer conductor being directly connected to the first end of the second outer conductor, the second end of the first outer conductor being directly connected to the second end of the second outer conductor, and the first end of the first outer

a first end of the first inner conductor is directly electrically connected in series to a first end of the second inner conductor and a second end of the first inner conductor is directly electrically connected in series to the second end of the second inner conductor; and

the first and second ends of the second inner conductor are electrically connectable across a capacitor to tune the inner conductors to the frequency and to provide an output of the antenna.

A magnetic resonance imaging system, comprising:

a receiver system; and

an antenna connected to the receiver system, the antenna comprising:

an inner conductor with first and second ends electrically connectable across a capacitor to tune the inner conductor to a frequency, the first and second ends providing an output of the antenna;

a first outer conductor substantially surrounding the inner conductor, the first outer conductor having first and second ends electrically connected across a capacitor to tune the first outer conductor to the frequency of the inner conductor;

a second outer conductor substantially surrounding the first outer conductor, the second outer conductor having first and second ends electrically connected across a capacitor to tune the second outer conductor to the frequency, the second outer conductor defining a plurality of holes therethrough; and

the inner and outer conductors defining a region for receiving a body part and being inductively coupled during operation.

84
78. A method of detecting magnetic resonance signals emitted by a subject for processing by a magnetic resonance imaging system by an antenna comprising first and second inductively coupled conductors, the method comprising:

tuning the first and second conductors to a frequency;

detecting the magnetic resonance signals by the first conductor while shielding the second conductor from direct detection of the magnetic resonance signals;

inducing signals in the second conductor corresponding to the magnetic resonance signals detected by the first conductor; and

providing signals from the second conductor to the magnetic resonance system for analysis.

85 84
79. The method of Claim 78, further comprising filtering the detected and induced signals.

86 84
80. The method of Claim 78, wherein the first conductor substantially surrounds the second conductor, thereby substantially shielding the second conductor.

87 84
81. The method of Claim 78, further comprising providing a coaxial cable unit defined by the first and second conductors, proximate a portion of the subject.

88 87
82. The method of Claim 81, wherein the coaxial cable is shaped to define a region for receiving a portion of the subject, the method further comprising positioning the coaxial cable unit around the portion of the subject.

89 ~~83~~. The method of Claim 88 ~~82~~, further comprising positioning a plurality of coaxial cable units around the portion of the patient, wherein each coaxial cable unit is inductively coupled to an adjacent coaxial cable unit, the inner conductors of each of the coaxial cable units are electrically connected to form a circuit tuned to the frequency, and the outer conductors of each of the coaxial cable units are electrically connected to form a circuit tuned to the frequency.

90 ~~84~~. An MRI transmitting antenna, comprising:

an inner conductor with first and second ends for being electrically connected across a capacitor to tune the inner conductor to a frequency, the first and second ends for receiving an input; and

an outer conductor substantially surrounding the inner conductor, the outer conductor having first and second ends for being electrically connected across a capacitor to tune the outer conductor to the frequency;

the inner and outer conductors defining a region for receiving a body part and being inductively coupled during operation.

91 ~~85~~. A magnetic resonance imaging system, comprising:

a radio frequency transmitting system; and

an antenna comprising:

an inner conductor with first and second ends electrically connected across a capacitor to tune the inner conductor to a frequency, the first and second ends being connected to the radio frequency transmitting system; and

an outer conductor substantially surrounding the inner conductor, the outer conductor having first and second ends for being electrically connected across a capacitor to tune the outer conductor to the frequency;

the inner and outer conductors defining a region for receiving a body part and being inductively coupled during operation.